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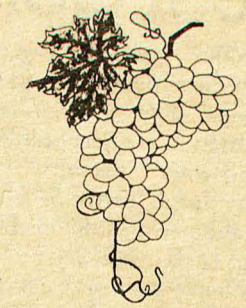
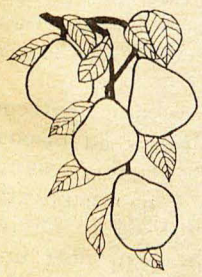
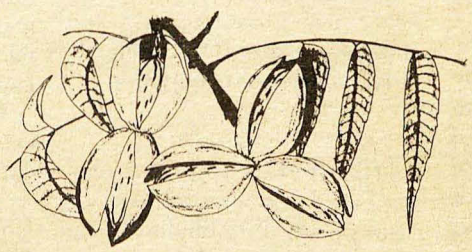
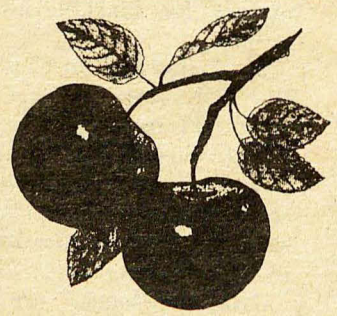
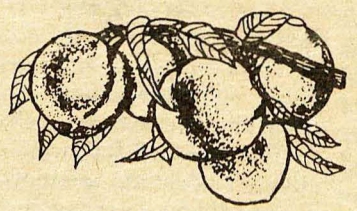
Fruit Gardening in the Landscape

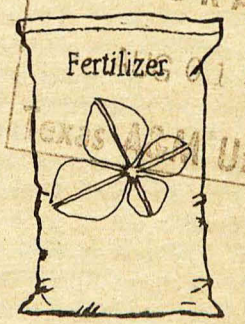












Texas Agricultural Extension Service • Zerle L. Carpenter, Director • The Texas A&M University System • College Station, Texas

Irrigate to Relieve Stress In Home Fruiting Plants

To maximize production and maintain plant health, it is important to irrigate plants through periods of stress. There are many ways of determining when and how much to irrigate, but the simplest is to supply 1 inch of water per week, whether by rainfall or irrigation during the growing season. When following this rule of thumb, begin watering when the soil begins to dry out after a rain. If prolonged wet periods are experienced, wait about 2 weeks before starting.

Since well-maintained lawns also need 1 inch of water per week, when a lawn is irrigated properly, most fruiting plants do not require additional water. It is important, however, that enough water is applied to wet the soil to a depth of at least 12 inches with each irrigation. This can be checked by pushing a metal rod into the soil until resistance stops its penetration at the wetted area. By wetting the soil to 12 to 18 inches, plants usually do not suffer from drought stress when waterings are missed.

In areas where the lawn is not watered, trees still require water. This can be provided in a number of ways; however, trickle or drip irrigation is one of the best methods. Trickle irrigation kits for lawn and garden use are readily available. When using drip irrigation, place enough emitters around the plants to water 50 to 70 percent of the root system. During hotter months of the growing season, operate drip systems a minimum of 10 to 12 hours, 1 day per week to maintain adequate soil moisture. They can be controlled by electric time clock, switching tensiometer or by hand. □

Prevention of diseases is more effective than controlling them. Likewise, healthy plants can withstand insect pests better than weak ones. A combination of cultural and chemical treatments should be utilized for successful production. The latest recommendations on current pesticides may be obtained from your county Extension office.

The information given herein is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Cooperative Extension Service is implied.

Climate Most Important Factor In Selecting Fruit, Nut Varieties

The climate more than any other factor determines if a particular fruit or nut variety will be successful in any part of Texas. The state has widely diverse climates ranging from sub-tropical Brownsville to the cold Panhandle, and rainfall of 60 inches and more in East Texas to the desert-like climate of West Texas. Most, but not all, fruit crops can be successfully grown in some areas of Texas.

Winter temperatures dictate where plants will grow because of chilling requirements and winter minimums. The chilling requirement is the number of hours between certain temperatures required before a plant starts normal growth in the spring. The critical range is between 32° and 45°F. Chilling units in Texas vary from 100 hours or less in the southern tip of Texas to over 1,000 in the Panhandle. If plants requiring many hours of chilling are planted too far south, they will not bloom and grow normally in the spring; conversely, if a low chilling plant is set too far north, its requirement will be satisfied early and any warm weather causes early bloom and probable freeze damage. Minimum temperatures also dictate plant selection since many fruiting plants freeze at relatively high temperatures. Bananas, for example, are damaged at 32°F while apples sustain temperatures of 0°F without damage if dormant.

Rainfall and accompanying high humidities also play an important role in plant selection. Irrigation can supplement rainfall, but water quality is critical on plants such as blueberries. High humidities in East and Central Texas increase disease pressures; therefore, in these areas use recommended resistant varieties where possible.

The varieties listed are those that are best adapted to a specific area. By choosing only recommended varieties, a homeowner has a much greater chance of success. Some overlap of zones is inevitable; however, those listed within zones are most likely to have annual production. □

Recommended planting distances, time to fruit, pollination requirements and pruning systems

Fruit	Spacing between plants	Years to first fruit	Pollination requirements	Pruning system
Apple				
seedling RS[1]	25 ft.	5	Cross[2]	Central
MM111 RS	20 ft.	4	Cross	Leader
MM106 RS	14 ft.	4	Cross	
M9 RS	10 ft.	3	Cross	Trellis
Apricot	18 ft.	4	Self[3]	Open center
Blackberry	3 ft.	1	Self	Remove old canes and top new canes
Blueberry	6 ft.	1-2	Cross	Thin center
Citrus	20-25 ft.	2-3	Most self	Maintenance
Fig	12 ft.	2	Self	Bush or central leader
Grapes	4-8 ft.	2-3	Self	Cane
Muscadines	10-20 ft.	2-3	Self and cross	Spur
Peaches	18 ft.	3	Self	Open center
Pears	25 ft.	5	Cross	Central leader
Pecans	40 ft.	4-7	Cross	Central leader
Plums	18 ft.	3	Cross	Open center
Strawberries	1 ft.	3 months	Self	Annual planting

[1]RS = Rootstock
[2]Cross - At least two different varieties needed for fruiting
[3]Self - Self-fruitful

Test Soil, Check Fertilizers

Under natural conditions plant nutrition is not a problem because slow growth and low production are acceptable. The homeowner usually wants many large fruits as soon as possible, so a judicious fertility program is necessary.

When purchasing a fertilizer, it is important to know what the numbers mean. A fertilizer label usually has three numbers such as 10-10-10. These numbers represent the percentage of nitrogen, phosphorus and potassium respectively in the mix. Thus, a 50-pound bag of 10-10-10 has 5 pounds each of N, P_2O_5 and K_2O. That is only 15 pounds out of a 50-pound bag. The rest is either other salts or inert fillers such as sand, perlite or other materials.

Nitrogen is necessary for all vegetative growth—roots, leaves, stems, flowers and fruits. Nitrogen deficiency causes lower leaves to turn yellow while excessive amounts delay maturity, causing increased vegetative growth and decreasing cold hardiness. Nitrogen is needed in all parts of Texas to maintain healthy plants.

A long-standing fertility recommendation has been to apply a high phosphorus fertilizer anytime a plant fails to bear; however, in most situations, phosphorus does not increase blooming in a fruiting plant. Phosphorus fertilization is needed most in sandy soils since clays and loams ordinarily have adequate amounts for perennial plants.

The role of potassium has not been well defined, but it is known to be one of the major elements in plant nutrition. Potassium deficiencies vary but stunted growth, dark or purple discoloration and leaf margin death are common symptoms in many plants. Most clay and loam soils in Texas have an adequate supply of potassium and additional amounts are not required. Most of the sandy soils require potassium fertilization to maintain healthy plants.

Many areas have problems with iron deficiency even though adequate amounts are present in most Texas soils. The alkaline (pH over 7.0) soils tie up iron, making it unavailable to the plants. Iron deficiency is normally found in new growth and is characterized by yellow leaves with a "road map" appearance because almost all the veins remain green.

Zinc deficiencies are a problem in pecans in most of the state. Zinc deficiency is characterized by small leaves, rosetted (highly branched, short bunchy) growth, twig and limb dieback and sometimes tree death. Leaf veins have a band of green on each side giving leaves a striped appearance.

What Kind to Use

Because Texas has such variability in its soil types, a single broad recommendation is not applicable in all cases. The best means of determining individual soil needs is to have a soil test done by the Texas Agricultural Extension Service's Soil Testing Laboratory. Information on sampling techniques and prices is available through your county Extension office.

Where soil tests are unavailable and a general recommendation is needed, use the following guidelines. On sandy soils, use a complete fertilizer such as 15-5-10 for most fruit crops. Acceptable rates are 3/4 pound per inch of trunk diameter per year of age for trees up to 10 years and 1.0 pounds per 10 feet of row for blackberries and grapes.

On loams and on clay soils, the only element generally required is nitrogen, which can be furnished with 1/2 pound of 21-0-0 per year of age or inch of trunk diameter up to 10 for trees or 3/4 pound per 100 feet of row for vine crops.

Iron deficiencies are common on most of the alkaline soils in Central, South and West Texas. Generally foliar iron sprays do not work well to correct iron deficiencies in fruit crops. Soil-applied iron chelates at label rates are the most effective. Iron sulfate (copperas) is seldom effective as a remedy for iron chlorosis of fruit trees or berries. Where iron deficiencies are a problem, do not use fertilizers containing phosphorus as they usually make the problem worse.

Zinc deficiency on pecans is a problem in most of Texas; therefore, make at least three applications of a foliar zinc spray each year during April and May for maximum growth. Do not spray other plants with zinc at rates used on pecans since leaf burn and defoliation may occur. When zinc deficiency is a problem on other crops, it can usually be corrected by soil applications of zinc sulfate. □

Weed Control Is Key to Success

Good weed control is a key to successful fruit and nut gardening. Weeds and grasses can stunt and even kill young trees and berries, and the competition for water and nutrients will seriously limit production of bearing fruit and nut trees.

Hand-hoeing is still the best answer to weed control in the home orchard. Mechanical tillage equipment is satisfactory but till only up to 2 inches deep to avoid serious damage to shallow feeder roots.

Mulching provides multiple benefits including weed control. Thick mulches keep light away from seedlings and provide a mechanical barrier to emergence. Mulching works best against weeds that come up from seed each year.

Organic mulches gradually deteriorate and fertilizer is used in this decomposition. If applying fertilizer on top of a thick organic mulch, apply extra fertilizer to compensate.

It may be aesthetically desirable to have a grass cover around fruit and nut trees that are a part of the landscape. Mature trees compete with grass much better than young trees, so keep a weed-free circle around the tree for the first 3 to 4 years.

Do not use herbicides in the home orchard unless all aspects of safe handling and application are fully understood. Glyphosate (Roundup®), a systemic weed and grass herbicide, has become popular in orchards because of its ability to kill persistent perennials such as bermudagrass and Johnsongrass. Glyphosate can also kill fruit trees and berries if there is significant contact with leaves or green bark. Spray drift as well as direct spray contact is dangerous so apply glyphosate or other contact herbicides when there is little or no wind and shield small plants.

Preemergent herbicides which prevent germination of weed and grass seed require specialized accurate spray equipment. Pump-up garden sprayers and most other types of hand-gun equipment are unsuitable. These chemicals should be used only by individuals who have the proper spray equipment and have a full understanding of calibration procedures.

Stay well away from fruit and nut trees and berries with selective lawn herbicides that contain 2,4-D. This hormonal-type herbicide kills broadleaved weeds but does not injure grasses. Slight spray drift or 2,4-D residue remaining in a sprayer can seriously damage or kill trees and berries. Grapes are especially vulnerable to 2,4-D.

It is always best to avoid use of any herbicides if safety and application procedures are not fully understood. A safe rule of thumb to follow is: "If in doubt, hoe it out." □

Control Diseases in Fruit, Nut Crops

Homeowners involved with growing fruit and nuts often experience reduced fruit quality or quantity due to plant diseases. Fruit and nut crops are susceptible to one or more disease problems throughout their life. Effective disease control involves using both cultural and chemical practices. Most diseases which infect fruit and nuts are caused by bacteria, fungi, viruses or nematodes.

Bacteria - Several bacteria cause serious problems on fruit plants. Fire blight of pear and apple, bacterial leaf spot and bacterial canker of peach and plum are three of the more frequently observed diseases in the home garden. Bacterial diseases are found in all areas but are generally more severe in areas of high to moderate rainfall. Bacterial diseases are controlled by resistant varieties, fungicides and cultural practices.

Fungi - This group of organisms is the most widespread and damaging to fruit and nut crops. Fungi survive on diseased plant material or on alternate crops. Vascular wilts, root, trunk and fruit rots and leaf spots are all symptoms of fungal infection. Disease problems are the most severe during periods of high humidity or when the plant tissue is covered by a thin film of moisture. Temperatures between 70° and 85° F are favorable for most fungi.

Viruses - Viruses are submicroscopic pathogens that increase in numbers once they are inside the host plant. Viruses can be spread by infected propagating material, insects, nematodes, seeds and mechanical methods. Individual virus cells are observed only with the aid of an electron microscope. Symptoms can often be confused with plant mutations, nutrient deficiencies, toxicities or symptoms resulting from other pathogens. Virus diseases are controlled with resistant varieties, rotations and weed and insect control.

Nematodes - Plants infected by nematodes develop distinct symptoms based on the type of nematode parasitizing the plant. Root knot, the most common and damaging, will cause galls or swellings on the roots, stunting and minor element deficiency. Resistant rootstocks, rotation and preplant nematicides are used to control nematode problems in home fruit plantings.

Disease Spread

Many disease-causing organisms are wind blown from diseased trees or plant parts to nearby healthy plants. Brown rot of peaches, black rot of grapes and scab of pecans are spread by spores carried by air currents. Once plants become infected, rain or irrigation water splashing on diseased parts further spreads the pathogens.

Disease-causing pathogens can also be spread mechanically during pruning, thinning, irrigating or cultivating. Equipment used to cultivate the orchard can also injure roots and limbs. This forms wounds through which disease-causing pathogens can enter.

Disease Prevention

Prevention of fruit and nut diseases is more effective than controlling them. Once a plant becomes infected there is little to do other than prune out the diseased part or remove the entire plant in the case of root rots or virus infection.

A disease prevention program should utilize a combination of cultural and chemical treatments. This requires some understanding of the disease-causing organisms and chemicals to be applied.

Cultural Practices

- Pruning - Remove dead and diseased limbs.
- Fertilizer - Maintain adequate levels of nutrients.
- Irrigation - Apply water on a schedule designed to prevent plant stress.
- Sanitation - Remove diseased plant material.

These practices should be followed on all fruit and nut crops to help insure that the fruit and nuts are free of disease.

Pesticide Application

In most cases chemical treatments are required to supplement cultural practices to produce quality, disease-free fruits and nuts. Pesticides should be used according to label. Applications should be sufficient to maintain control but not excessive. When applying a material for disease control, make sure the foliage, fruit or nuts are well covered with a protective fungicide film. Most products used for disease control are effective for only 10 to 14 days. Repeated applications are needed as long as weather conditions are favorable for disease development and the plant is susceptible to the pathogen. □

Zones of Adaptation for Fruit, Nuts in Texas

FRUIT VARIETIES
FOR TEXAS HOMEOWNERS

Peaches

Zone 1: Springold, Bicentennial, Surecrop, Sentinel, Ranger, Redglobe, Denman, Milam, Jefferson, Belle of Georgia, White Star

Zones 2-3: Springold, Bicentennial, Sentinel, Ranger, Harvester, Redglobe, Milam, Denman, Loring, Dixiland, Redskin, Jefferson, Surecrop, Belle of Georgia

Zone 4: Springold, Bicentennial, June Gold, Sentinel, Harvester, Redglobe, Summergold, Loring, Milam, Dixiland, Redskin, Jefferson, Melba, Palace, White Hale

Zone 5: Springold, Bicentennial, June Gold, Sentinel, Rio Grande, Harvester, La Feliciana, Loring, Dixiland, Redskin, Melba Palace, White Hale

Zone 6: Earli Grande, Florda-Grande, Florida King, June Gold, La Feliciana, Texstar, Flordaglo, Starlite

Zone 7: Earli Grande, Tropic Beauty, TropicSweet, Flordaprince, Florda Grande, TropicSnow, Flordaglo

Figs

Zones 1-3: Texas Everbearing, Celeste

Zones 4-5: Texas Everbearing, Celeste, Alma

Zones 6-7: Celeste, Alma

Apricots

Zones 1-3: Bryan, Hungarian, Moorpark

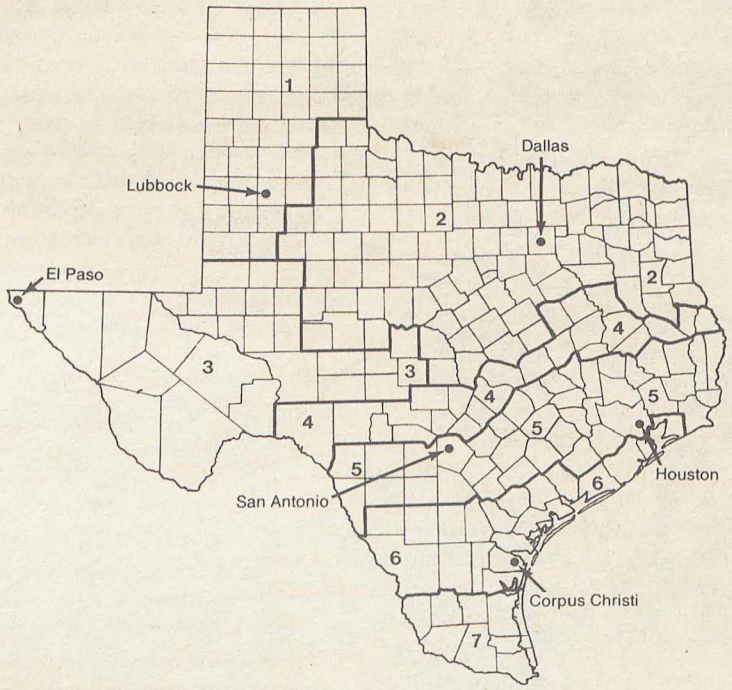
Zones 4-6: Bleinheim, Royal

Persimmons

Zone 2: Eureka, Hachiya

Zones 3-6: Fuyu (Fuyugaki)

Zone 7: Tanenashi, Tamopan



Numbered zones for stone fruit, apples and other varieties commonly grown in Texas.

Nectarines

Zones 1-3: Redglobe

Zones 1-5: Armking, Crimson Gold

Zones 6-7: Sun Red

Plums

Zones 1-3: Morris, Methley, Ozark, Premier, Bruce, Allred

Zones 4-6: Methley, Allred, Bruce

Zones 6-7: Gulfruby, Gulfgold

Jujubes

All Zones: Li, Lang

Pomegranates

All Zones: Wonderful

Pears

Zone 1: Orient, Moonglow, Ayers, Kieffer, Surecrop, Maxine, LeConte, Magness

Zones 2-4: Orient, Moonglow, Kieffer, LeConte, Ayers, Garber, Maxine

Zones 5-6: Orient, Kieffer, LeConte, Monterrey, Fan-stil, Pineapple, Garber

Loquats

Zones 4-6: Ornamental

Zone 7: Fruit Production

Apples

Zone 1: Starkspur G. D., Red Chief, Starkrimson R. D., Smoothee, Top Red, Prime Gold, Jerseymac, Granny Smith, Gala

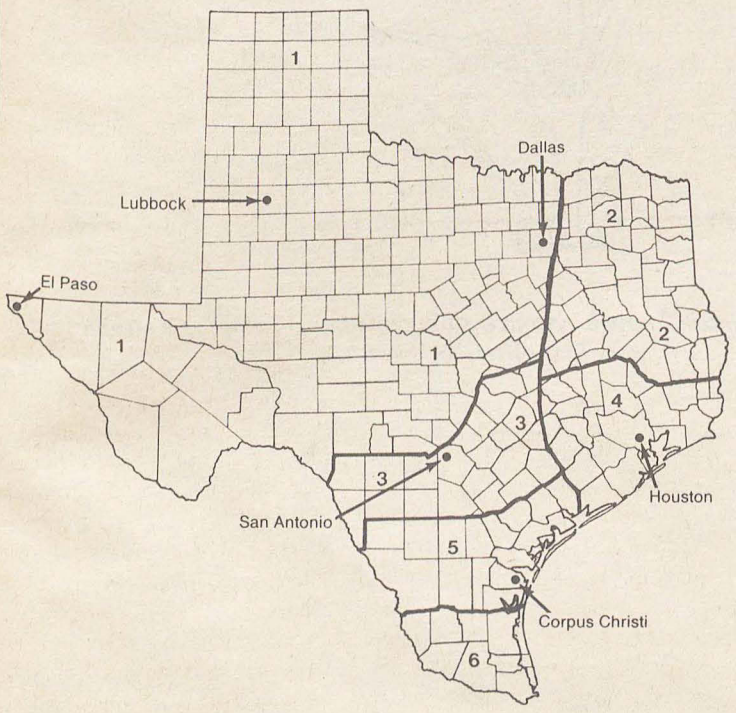
Zone 2: Top Red, Red Chief, Starkrimson R. D., Starkspur G. D., Smoothee, Prime Gold, Jerseymac, Mollie's Delicious, Granny Smith

Zone 3: Jerseymac, Gala, Starkspur G. D., Starkrimson R. D., Mollie's Delicious, Ozark Gold

Zone 4: Jerseymac, Gala, Mollie's Delicious, Starkrimson R. D., Granny Smith

Zone 5: Ein Sheimer, Anna, Dorsett Gold, Mollie's Delicious

Zones 6-7: Ein Sheimer, Dorsett Gold, Anna



Numbered zones for berry varieties.

BERRY VARIETIES FOR TEXAS
HOMEOWNERS

Blackberries

Zones 1-2: Brazos, Rosborough, Womack, Brison, Cheyenne, Shawnee, Hull

Zones 3-4: Brazos, Rosborough, Womack, Brison

Blueberries

Zone 2: Tifblue, Woodard, Delite, Briteblue, Climax, Premiere, Brightwell

Zone 4: Climax, Sharpblue, Beckyblue, Tifblue, Woodard, Premier, Brightwell

Red Raspberries

Zones 1-4: Dorman Red

Strawberries

Zones 1-2: Sunrise, Cardinal, Allstar

Zones 3-4: Sequoia, Douglas, Chandler, Tioga, Fresno, Tangi

Zones 5-6: Sequoia, Douglas, Tioga

Fruiting Plants Need Drainage

For productive, long-lived fruiting plants, a well-drained soil is needed. Unfortunately, the average homeowner only has a small plot and must work with what he or she has. In deciding whether or not fruiting plants are adaptable to an area, some general observations are useful: 1) Does water stand for long periods of time? 2) What is the area's native vegetation? 3) Are there many yellow (iron deficient) plants around?

If a yard has an area where water stands for long periods after rains or the soil stays wet for a prolonged time, avoid these areas and soils for fruit because most fruiting plants do not tolerate wet roots. Standing water or wet soil actually causes root death from lack of oxygen. A quick check for suitable water drainage is to dig a hole 30 inches deep and fill it with water. If the water is gone within 24 hours, drainage is usually acceptable. Any soil that does not drain within 48 hours is considered unacceptable for most fruiting plants.

If the soil is poor enough that it is not acceptable for the plant you wish to grow, raised beds can be used with limited success. Remember that plants, especially trees, will not live as long planted in this manner as they would if planted in a good soil at ground level. Raised beds for fruit trees such as peaches should be at least 8 feet square and 12 inches deep. Do not use highly organic soils to make beds as the trees may grow later in the year and be more subject to freeze injury. Construct raised beds with a frame of railroad ties or edging timbers, or simply mound the soil and plant atop the mound. □

NUT AND GRAPE VARIETIES
FOR TEXAS HOMEOWNERS

Pecans

Zone 1: Mohawk, Shoshoni, Cheyenne, Pawnee, Merrimac

Zone 2: Wichita, Western, Cheyenne, Tejas, Mohawk

Zones 3-5: Kiowa, Choctaw, Cheyenne, Wichita, Shawnee, Mohawk, Western, Caddo, Sioux, Desirable

Zones 4-7: Desirable, Choctaw, Cheyenne, Shawnee, Kiowa, Caddo, Cape Fear

Walnuts

All Zones: Reda, Desirable, Fately, Hansen, Broadview

Pistachios

Zones 1-5: Kerman (female), Peters (male)

Chestnuts

Zones 4-6: Nanking, Seedlings, Revival

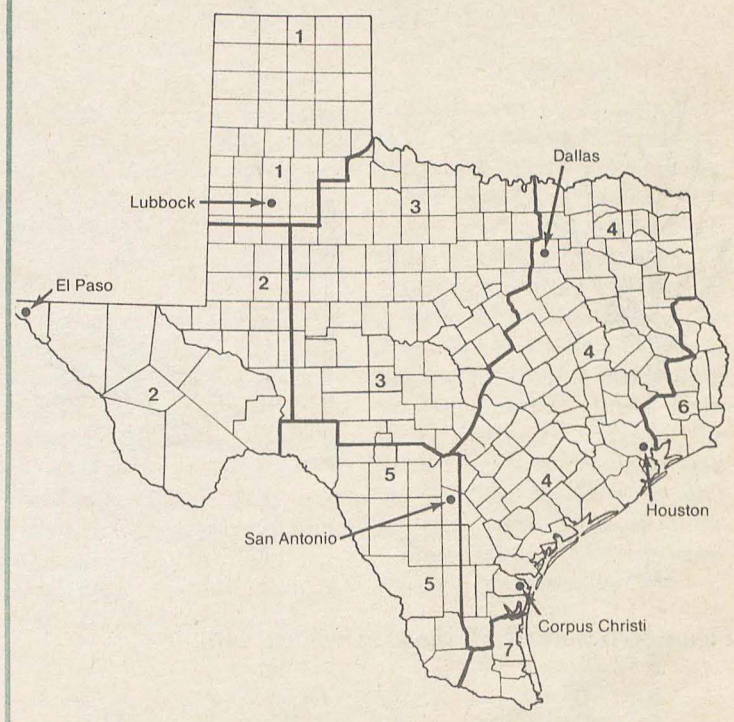
Grapes

Zones 1-3: Hybrid, Vinifera, American

Zone 2: Vinifera only

Zone 5: American

Zones 4-7: American, Desirable, Mars, Orlando, Muscadine



Numbered zones for nuts and grapes adapted to Texas.

Grapes: Hybrids

Seibel 9110
Rayon d'Or
Aurelia
Reliance Seedless
Orlando Seedless
S.V. 12-375
Vidal 256
Mars Seedless
Seibel 7053

Grapes: Muscadines

Higgins
Summit
Fry
Regale
Cowart

Grapes: American

Champanel
Favorite
Norris
Black Spanish
Lake Emerald

Grapes: Vinifera

Cabernet Sauvignon
Sauvignon Blanc
White Riesling
Thompson Seedless
Black Monukka
Chardonnay
Chenin Blanc
Muscat Canelli
Flame Seedless

Pierce's Disease-Resistant Hybrids

Orlando Seedless, Blanc du Bois, Roucaneuf, Villard Blanc

Use Open Center, Central Leader Pruning

The two most commonly used tree training systems are the open center and central leader. Open center systems are generally used on peaches, plums, apricots and almonds. Apples, pears, pecans and persimmons are normally trained to a central leader. There are good and bad points to both, but neither system dictates that the trees specifically be pruned a certain way. In fact, many trees often are not pruned or trained at all. However, contrary to some popular beliefs, pruning is important for producing most fruit and nut crops. Do not get bogged down in specifics but rather keep principles in mind.

Both training systems start out in essentially the same way. Fruit tree branches which are 30 to 36 inches in length or larger, or nut trees 4 to 7 feet tall are cut back by one half at planting with all side shoots removed (Figure 1). This forces out strong vigorous shoots which can be easily trained to the desired system.

Open Center — The open center or vase system of training simply involves maintaining a framework of branches around an open "vase" in the middle of the tree. This allows sunlight to penetrate into all parts of the tree allowing for good production in all areas. The key to open system training is to develop a strong open center framework in the first 2 or 3 years (Figure 2) and subsequently maintain this shape (Figure 3). This later pruning involves the heading-back of shoot terminals to outward growing branches, the removal of large fast-growing branches that fill the open center and the removal of crowded branches and any diseased or broken limbs. This reduces the height and keeps the center of the tree open.

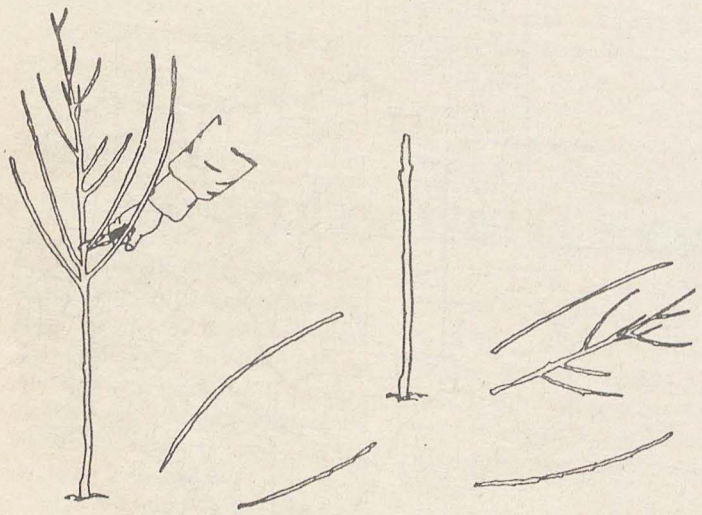


Figure 1. Remove all side shoots at planting time.

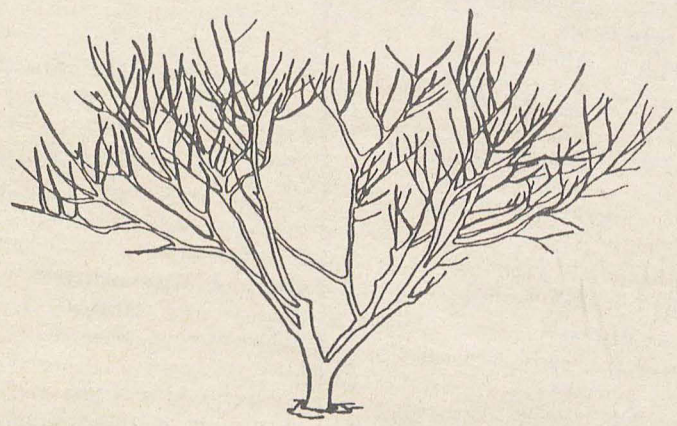


Figure 3. Shape of the open system must be maintained throughout the life of the tree.

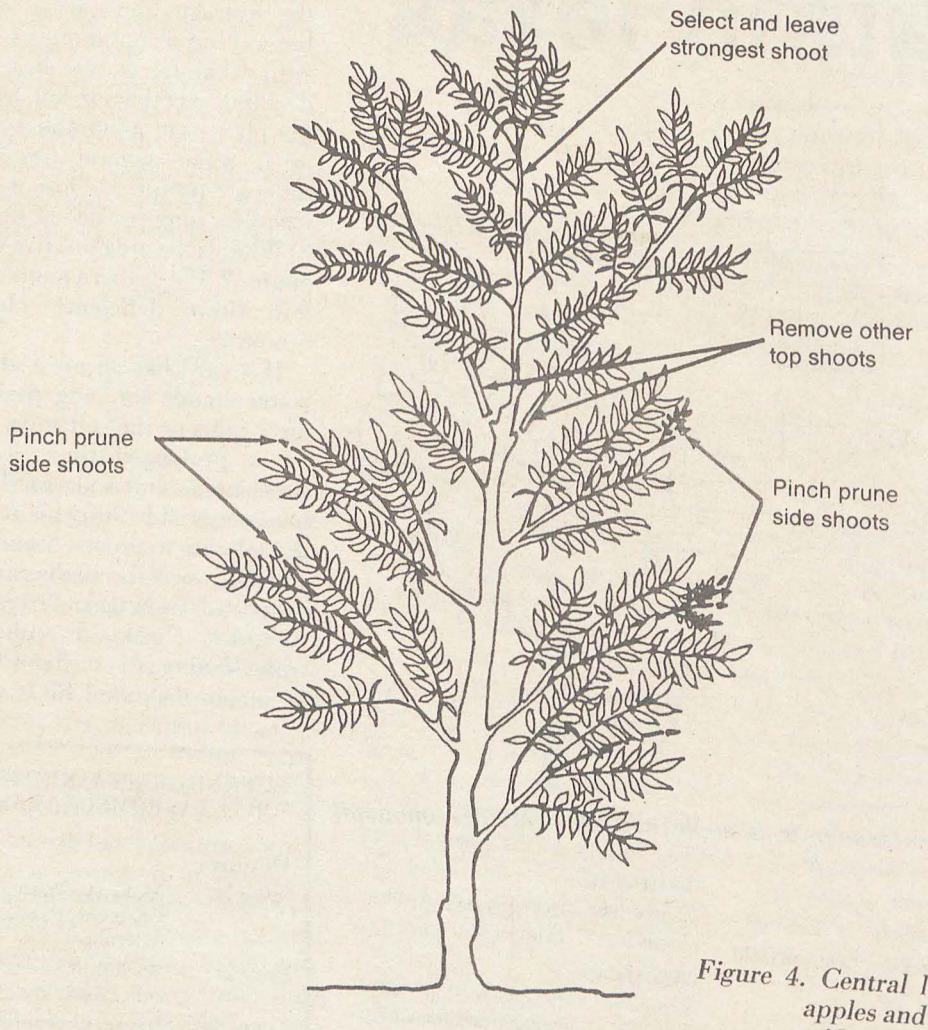


Figure 4. Central leader pruning is generally used for pecans, apples and pears. A central trunk supports scaffolds with wide-angle crotches.

Central Leader — The central leader system consists of a central trunk around which scaffolds (primarily side branches) of the desired number and spacing can be arranged with wide-angle crotches. From three to eight scaffold branches are commonly developed from the central leader trunk. A "modified" central leader tree is cut back each winter and a new central leader shoot is selected each spring. Pecans, apples and pears are generally pruned in this manner (Figure 4). The top center of modified central leader trees is often thinned out for better light penetration into the interior of the tree canopy. Uniformly space the scaffolds around the central leader.

Specific guidelines for each pruning system are outlined in the Home Fruit Production series for each crop. □

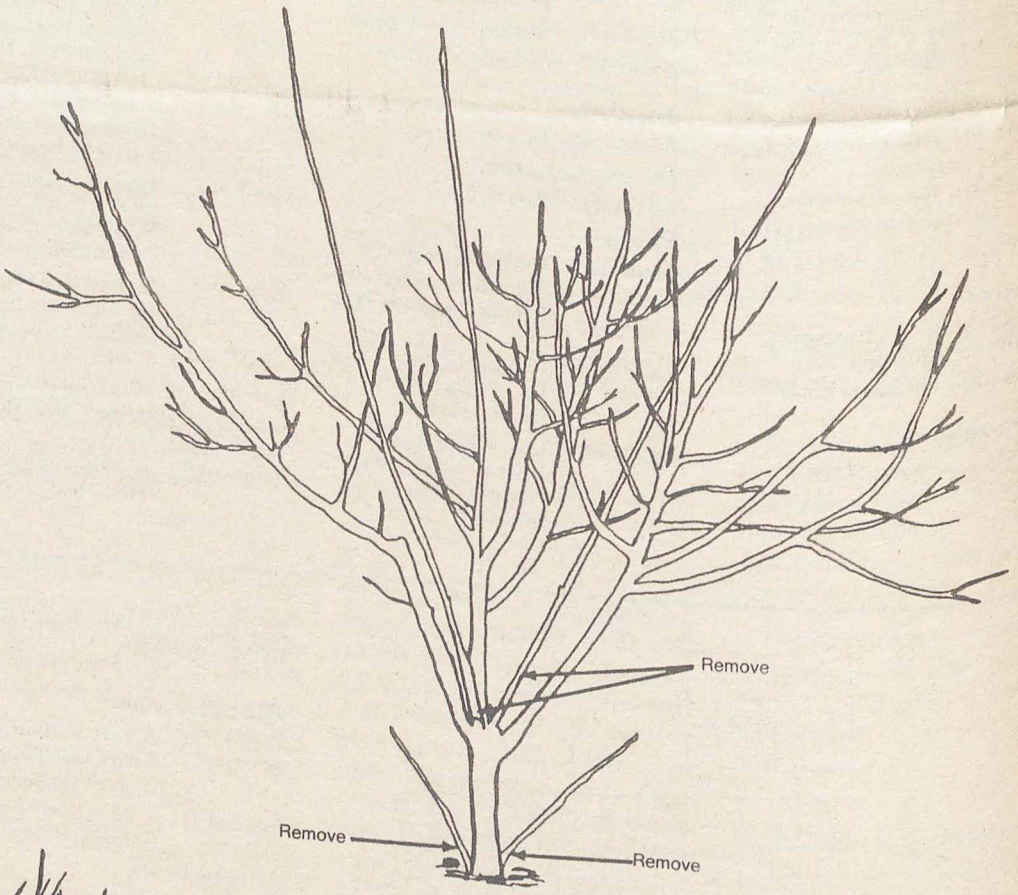


Figure 2. Open system training involves developing a strong framework in the first 2 or 3 years.

Grapes, Berries Require Training, Careful Pruning

Grape Training and Pruning

Grapes require severe pruning to develop high shoot vigor during training and to maintain production of quality berries on mature vines. Prune back leaving only two buds at planting.

First growing season — Allow growth to develop at random to establish a good root system.

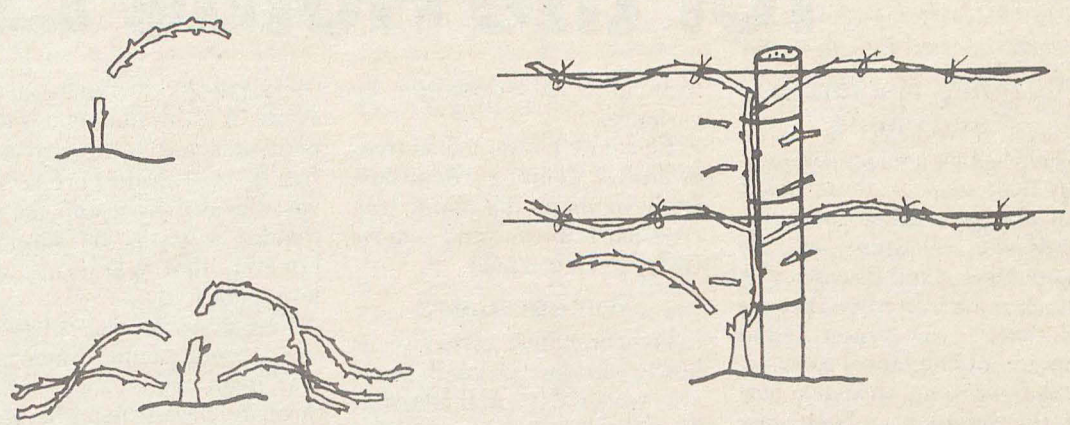
First winter — Prune off all growth except one shoot with two good buds.

Second growing season — Choose the most vigorous shoot and train it up a stake. Tie the vine to the stake every 6 inches. Keep side shoots pinched off but keep leaves on the trunk. When the shoot reaches just above the cordon wire, pinch out the tip to force lateral branching. Train laterals (arms or cordons) down the wires, tying regularly to keep the cordon straight and in place.

Mature vines — Cane pruning and cordon pruning are two basic systems commonly used. With either system, winter prune the vine leaving a total of about eight buds of the previous summer's growth prior to the third year and 20 to 40 buds per vine on mature vines.

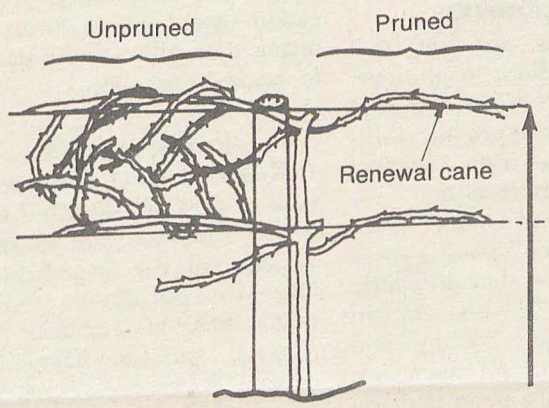
Cane pruning is best for varieties that produce few fruit on basal buds such as Thompson seedless and for small clustered varieties. With this system, all four arms are removed each winter. One-year shoots (renewal canes) are tied to the wires to replace the old arms. Cut off the tip of each renewal cane at a point where it is approximately 3/8 inch in diameter.

Cordon training is most commonly used in Texas vineyards. This system consists of leaving about seven upright spurs (two buds/spur) on each cordon. All other growth is removed. Use clothesline-like T-top with a wire at each end to more efficiently catch and spread the upright cane growth. For this, a 2-foot wire T-top replaces the single top wire shown.

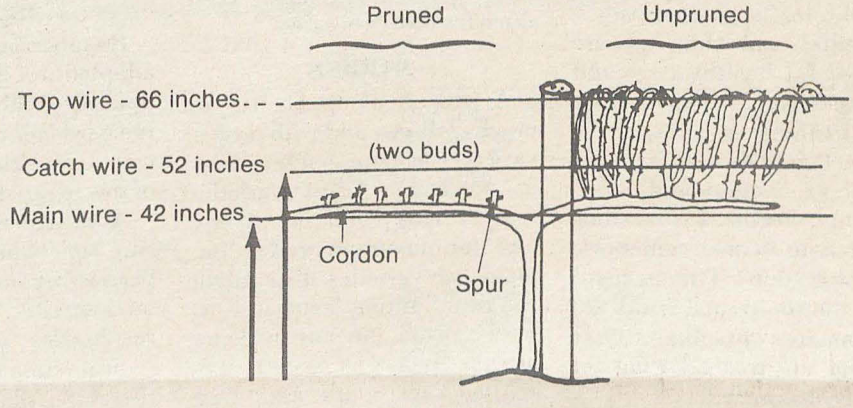


Stages of Grape Cane Pruning

Top, left: Prune severely at planting to only two buds.
Bottom, left: Prune off all growth except main shoot with two buds during the first winter.
Above, right: Train most vigorous shoot to a stake during the second growing season. Tie every 6 inches.



Cane Pruning

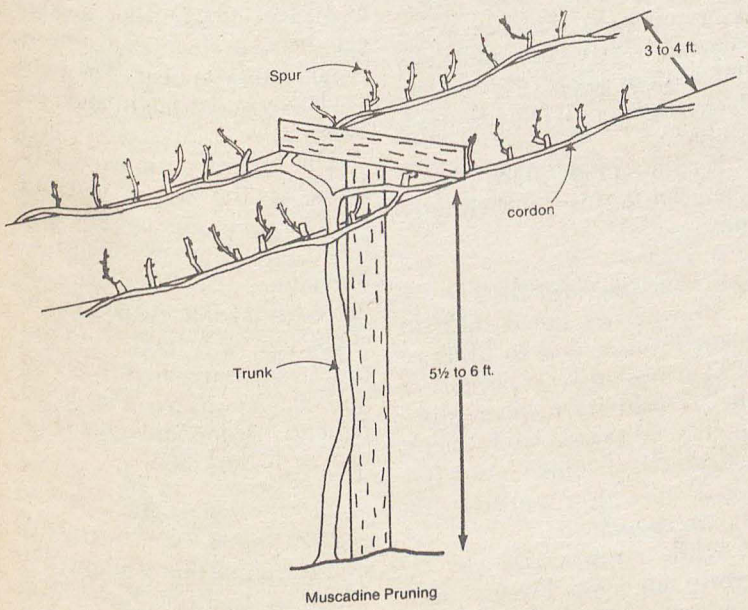


Cordon Training

Muscadine grapes are usually cordon-trained, but because of greater vine vigor, muscadine vines can be allowed to support up to four cordons with spurs of three to five buds each.

Grape arbors — Productive and attractive arbors are easiest to maintain using cordon training. Develop parallel, spur-pruned cordons about 2 feet apart across the top of arbor.

Black Spanish and Champanel are excellent arbor varieties. Muscadines also make good arbor grapes in East Texas.



Muscadine grapes should be trained on parallel spur-pruned cordons.

Berry Training Systems

There are different types of blackberries and raspberries that range from erect, free-standing plants to trailing vines. The training systems differ according to the type of growth.

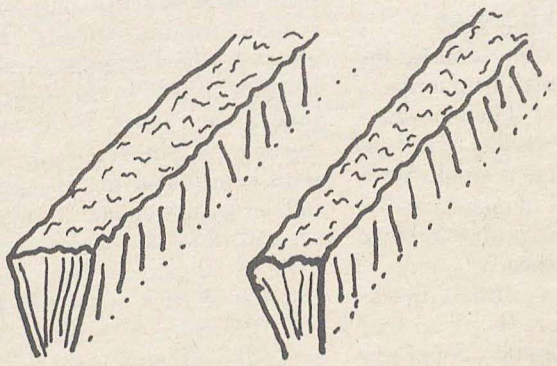
Erect blackberries and raspberries produce low sprawling growth the first year after planting, but in the second and subsequent years new growth is very erect. Clip the tips from new canes two to three times between May and September to force side-branching and develop a full, compact hedgerow. Prune the hedgerow much as you would an ornamental hedge. A well-pruned hedgerow of erect berries does not need trellis support.

Fruiting canes die soon after fruit have matured. An accumulation of dead canes poses a considerable nuisance when picking berries, so it is best to keep dead canes removed.

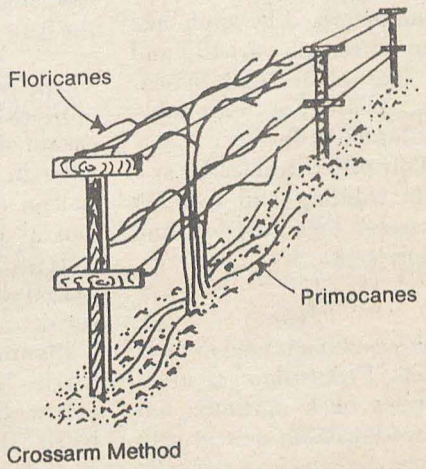
Winter pruning is not needed if berries are properly pruned in the summer.

Trailing and semi-erect blackberries and raspberries need to be trellised. A proper trellis allows the canes to be spread for good sunlight exposure.

Tip new canes two or three times each summer to encourage more branched growth. Leave new canes (primocanes) of trailing blackberries on the ground each winter to help protect them from freeze damage. Trellis the canes before they begin growth in mid-March. Remove and destroy fruiting canes (floricanes) after harvest in the summer as soon as they die. □



Clip berry plant tips to develop a compact hedgerow.



Trailing and semi-erect berries need to be trellised for good sunlight exposure.

Choose Adapted Fruit Varieties for the Home Landscape

Peaches, Nectarines and Plums

Peaches are a major commercial fruit crop in Texas which can also be used in the home landscape. Because of the many insects and diseases that attack stone fruit trees, they are relatively short-lived and should not be planted as specimen trees in an attractive part of the landscape. With care they can produce bountiful crops of delicious fruit.

Nectarines and plums are more difficult to grow because insect and disease problems are worse on fruit without fuzz.

Careful variety selection is necessary. Non-adapted varieties lead to poor production and disappointment. Nemaguard peach is the preferred rootstock for Texas stone fruit.

Pruning and thinning are required for healthy trees and consistent production of large fruit. Pruning encourages the vigorous growth required for annual production and keeps trees manageable. Prune stone fruit trees to an open center (see pruning section). Thin by hand about the time small fruits are the diameter of a dime. After thinning, fruit should be at least 6 inches apart.

Pears

Fire blight, a bacterial disease that kills leaves, branches and sometimes whole trees, is the chief limiting factor to growing pears in Texas. Pears are also readily killed by cotton root rot. Other disease and insect problems are usually minimal. A regular spray program is not usually necessary.

Do not grow popular varieties such as Bartlett because of extreme vulnerability to fire blight. Plant only blight resistant varieties in Texas. Plant at least two pear varieties to insure good fruit set.

Asian pears are attracting considerable attention because of their high quality fruit. They are characterized by apple-like shapes on certain varieties and apple-like texture with a pear flavor. These are reasonably well-adapted in Texas.

Follow the central leader system in training and pruning pear trees. (See training and pruning section.)

Figs

Figs are well adapted in most of Texas. Freeze damage often kills trees back partially, but fruit are borne on new growth so freeze damage is not usually a serious limitation.

To prevent entry of insects and premature spoilage of the fruit, grow only closed-eye fig varieties.

Figs may be trained as trees or bushes. Pruning is done basically to shape the plant, thin crowded branches and remove freeze-damaged food.

Pomegranates

Pomegranates, attractive as bushy shrubs or small trees, are reasonably well-adapted. There is a wide fruit variation among those grown ornamentally.

Wonderful is the only variety with good fruit quality that is available from nurseries in Texas. This variety has large, deep purple-red glossy fruit. The kernels and juice are crimson with good flavor; seeds are small and tender, and the rind is of medium thickness. It is eaten fresh or processed.

Apples

Apples are a popular fruit in much of Texas, and with proper variety selection, can be grown in all areas. Most varieties require cross pollination; therefore, for maximum production, plant two varieties. Fire blight can be a limiting factor in East Texas; prune out any evidence of this disease as soon as it is spotted. In South and West Texas, cotton root rot is the major cause of tree loss. Do not plant apples in spots where this disease has killed other plants.

In selecting trees, choose from three size categories — standard, semi-dwarf and dwarf. This refers to the rootstock used. See table on front page for recommended rootstocks. Spur-type varieties are naturally small and probably should not be planted on full dwarf rootstocks.

Standard and semi-dwarf trees are best pruned to a central leader while dwarf trees do well when trained along a fence or trellis.

Apples usually produce too many fruit per tree and require thinning. Thin to only one fruit (the largest) per cluster before the fruit reaches golf ball size.

Blackberries

Blackberries are among the easiest of all small fruit crops to grow in Texas. They produce well on a wide variety of soils as long as drainage is good. Avoid soils with a pH of more than 8.0 as iron chlorosis is impossible to correct economically.

Plantings of Brazos blackberries have produced up to 1 gallon of berries per foot of row when properly cared for. Realistically, plan for about 1 to 2 quarts per foot of row and plant accordingly.

Set either root cuttings or young plants 2 to 3 feet apart in a row. If more than one row is planted, space the rows 10 to 12 feet apart. The most productive varieties are erect and do not require a trellis or support; however, first year canes will not stand erect.

Frequent watering is beneficial to young plants. Water first year plantings at least weekly through harvest. After harvest, some moisture stress is not detrimental to a healthy planting.

Blackberries can usually be grown without an extensive pesticide program. Disease problems can be severe in portions of East and Southeast Texas. Plant blackberries far away from wild blackberries to minimize disease problems.

Raspberries

Raspberries are not well adapted to Texas conditions; however, with effort and care the gardener can produce sufficient quantities from a few feet of row to satisfy his taste.

Avoid calcareous and heavy clay soils when planting raspberries because they do poorly on these sites. The best adapted raspberries are trailing and require support for the vines; therefore, plant them beside a fence unless a trellis is built to support plants.

Frequent watering and mulch are necessary to attain any degree of success. Mulch with 4 to 6 inches of sawdust, hay, leaves, bark or other organic media. This keeps plant roots and crown cool and moist for longer periods.

Blueberries

Proper soil, water and care are essential for successful blueberry growing. Blueberries require acid, sandy soils with a pH of 4.5 to 5.5. These soils occur extensively in East and Southeast Texas and in localized pockets in North, Central and South Texas. They also require good quality water with low sodium and bicarbonates.

Blueberries thrive best in soils enriched with composted organic matter. Ideally, mix about 1/2 bushel of peat moss with the topsoil in the planting hole of each plant. If attempting to grow blueberries in soils with insufficient acidity, dig a hole at least 36 inches in diamter and 18 inches deep and mix at least 50 percent composted organic matter with the top soil. Blueberries thrive in 100 percent peat moss so there is no limit to the amount used.

Calcareous or clay soils are almost impossible to modify sufficiently for blueberries. Blueberry enthusiasts with unsuitable soils should grow plants in tubs using a potting soil high in peat moss.

Plant at least two blueberry varieties to insure adequate cross pollination. The listed varieties are all of the rabbiteye type. Other types of blueberries are not well adapted to Texas.

Mulch plants heavily with organic material such as pine bark, sawdust, leaves, grass clippings, wood chips or hay. This aids in moisture conservation and weed control.

Blueberries are sensitive to over-fertilization. Spread fertilizer uniformly over the root area beneath and out from the plant. Use several small applications (1/8 to 1/4 cup per plant) during the spring and summer rather than a single large application. Avoid nitrate forms of nitrogen. Fertilizers formulated for azaleas work well.

Persimmons

Native persimmons are common in most of Texas, but gardeners usually prefer to grow varieties of the large-fruited, attractive Japanese persimmons. Available Japanese persimmon varieties have fruit ranging from red to orange in color and from flat to conical in shape. Most are astringent (sharp and puckery) if eaten before they are soft-ripe, but the Fuyu (Fuyugaki) variety becomes non-astringent while fruit are still firm.

Most Japanese persimmon varieties are compact and upright, and trees can be planted as close as 10 feet apart. Train persimmon trees to a central leader (see training and pruning article). Very little pruning is needed.

Insect and disease pests are not usually a serious problem. Premature fruit drops often occur on trees that are experiencing severe soil moisture fluctuations so provide regular, deep irrigations if fruit drop is a problem.

Fertilize moderately with a balanced fertilizer in February and June.

Strawberries

Strawberries are a difficult plant to grow and to produce fruit in most of Texas because of their sensitivity to poor water quality, diseases and nematodes. Buy only virus-free plants to insure the best production possible.

While strawberries can be grown for several years, they perform best in Texas when grown as an annual plant. This production system eliminates the need to carry plants through the ravages of summer.

In South Texas, plant annual strawberries from late September to the first week of October. They require a great deal of care; do not allow them to dessicate. In this system, set plants in double rows 42 inches wide and 12 inches apart. In North and West Texas, annual planting is done in spring after freeze danger is past. Production is greatest the next spring. Remove the beds after production.

In areas where soil is saline or contains too much clay, construct a raised bed about 10 inches deep. Fill with loose, pliable, well-drained soil.

Planting Systems for Strawberries

Fall Planting System
Set plants the last week of September to the first week of October. After harvest the following spring, plants are usually destroyed.

Spring Planting Systems
Set plants 18 inches apart in a single row. Runners set through the summer develop a matted row. The primary crop is harvested in the spring, 1 year after planting.

Jujubes

Jujubes are not well known but will thrive throughout Texas. Common names such as "Chinese date," "date," "Chinese apple" and "Chinese olive" are sometimes used. They bear their date-like fruit more consistently and abundantly in the arid West Texas climate.

Most jujube trees are upright and slender, often reaching 30 feet, with glossy, attractive leaves. Many of the trees found in Texas are seedlings. The trees are often thorny, although the most commonly available improved varieties, such as Li and Lang, are not thorny.

Trees can be planted as close as 15 feet apart. Root suckers can be a problem, so remove them as they appear. The trees are hardy and drought and pest tolerant.

The fruit ripen in early fall. Fruit of the larger varieties such as Lang are as large as 2 inches long and 1 1/2 inches in diameter. The fruit can be eaten fresh while the peel is still slightly green. Mature fruit can be left on the tree to turn brown and dry naturally. The dried fruit are used in much the same way as the true date.

Loquats

The loquat is an attractive evergreen tree that is adapted to much of Central, East, West and South Texas. Winter damage is a problem in more northern portions of Texas that experience winter temperatures below 10°F. □

Plant Pecans, Other Nut Varieties in Texas

Pecans

The pecan, which is the state tree, is native to some 150 counties. As such, it is popular for its aesthetic value in the landscape as well as for the tasty nuts obtained in the fall. Despite their appeal, pecans are not carefree trees.

Even with the limitations of soil requirements, need for regular zinc spraying and numerous insect and disease pests, pecans are universally adapted to the home landscape. Pecans grow best in deep, well-drained soil. They do not tolerate "wet feet" or poor drainage. All pecan varieties require cross pollination; however, in most cases, sufficient pollen is available. In isolated instances, check on pollination before selecting varieties. There are hundreds of named varieties and literally millions of unnamed varieties, since pecans do not "come true" from seed. Every native or seedling pecan tree is a separate and distinct variety. Seedling (ungrafted, grown from seed) trees make very good landscape trees. Nut quality on seedling trees is variable but often good. Those trees do better than improved varieties if grown under minimal landscape management. Improved varieties usually require zinc, nitrogen, water and pest management to maintain a healthy tree.

Plant pecan trees at least 40 feet apart in the home landscape and at least 20 feet from major buildings and property lines. Cut the trees back by half at planting. Train them to a "central leader" with a single central trunk and wide angle branches.

Walnuts

Black walnuts and carpathian (English) walnuts are climatically adapted to essentially all parts of Texas. Several species of black walnuts thrive as natives in Texas. They are of little value as nuts because of their thick hard shells. Improved black walnut varieties such as Thomas are commonly propagated and sold through nursery sources.

The acid and neutral pH soils of East and North Texas are suitable for carpathian walnuts, but common rootstocks used for carpathians do poorly in the extremely alkaline soils of South, Central and West Texas. Carpathians thrive in western portions of Texas if they are grafted onto the native Central and West black walnuts — *Juglans microcarpa* (Texas black walnut) or *Juglans major* (Arizona black walnut). Very few nurseries propagate these native black walnuts as rootstocks so this is usually a do-it-yourself project.

Carpathian walnut trees are smaller than pecans and can be planted as close as 25 feet apart. Care of walnut trees is much the same as for pecans.

Walnut blight is the most serious problem with carpathian walnuts. Disease pressures are greatest in East Texas and coastal areas. Walnut blight can infect young nutlets during bloom period and as nuts approach maturity. Plant blight-resistant varieties (Reda or Hansen) in more humid areas.

Pistachios

The nut-bearing pistachio is best adapted to the more arid portions of West and Central Texas. Disease pressures make success difficult in East Texas and in coastal areas. Pistillate (female) and staminate (male) flowers are produced on separate trees. Plant at least one male for every 10 female trees.

The Kerman (female) and Peters (male) varieties are by far the most common. Pistachio trees are difficult to obtain in Texas because most propagating nurseries are in California, and the trees are generally started in containers, making them more expensive to ship. Nurseries can order trees if they don't already carry them.

Pistachio trees are relatively small at maturity and can be planted as close as 15 to 20 feet apart. They usually begin to bear 4 to 5 years after planting. Nuts mature in the fall.

Chestnuts

The Chinese chestnut is the only chestnut that is reasonably adapted to portions of Texas. This tree is tolerant to the chestnut blight that has killed most native American chestnuts throughout the eastern and central United States.

Chinese chestnuts grow best in the acid soils of East Texas and are poorly adapted to the extremely alkaline soils of portions of South, Central and West Texas.

Many of the Chinese chestnut trees purchased through nursery sources are seedling trees. Several grafted varieties, including Nanking, are also available. Plant Chinese chestnuts at least 30 feet apart. Care of chestnut trees is much the same as for pecans. In the early years prune only enough to develop a single trunk and basic scaffolds. Excessive pruning delays the onset of bearing. □

Note Limitations for These Fruits, Nuts

Catalogs paint pretty pictures that tempt us to try at least one of everything, but not all fruits and nuts are adapted to all parts of Texas, and sometimes are not adapted at all. Reasons for poor adaptation vary from temperature-related problems to humidity and disease limitations. Some of the more notable fruit and nut crops which have problems in some areas are discussed below.

Almonds — Trees are well adapted but they bloom early and usually lose their crop to late winter freezes.

Apricots — The trees are well adapted to all areas except extreme South Texas; however, fruiting is inconsistent in much of the state. Poor fruit set is often blamed on freeze damage from early bloom and on self-unfruitfulness of varieties, but apricots usually bloom no earlier than peaches and essentially all varieties are self-fruitful. Fruit set is more consistent in arid West Texas than in central and eastern portions.

Cherry — Most of Texas lacks sufficient winter chilling needed to produce a normal bloom. Sour cherry varieties, such as Montmorency, bear with fair consistency in North Texas. Sweet cherry varieties are winter-killed due to fluctuating temperatures and are unadapted to all of Texas.

Filbert — The filbert (hazelnut) is poorly adapted to hot Texas summers. It is best adapted in climates that do not exceed 90°F in the summer.

Gooseberry and Currant — These berries will not tolerate our hot Texas summers and are seldom fruited here.

Kiwifruit — Kiwifruit has proven to be difficult to grow in Texas. The major limitations include susceptibility to freeze injury, only fair heat tolerance and poor wind tolerance. A separate species of kiwifruit with much greater cold tolerance is being promoted in garden catalogs. It has a smaller, less desirable fruit than commercially available kiwifruit.

Macadamia — Macadamia nut trees are tropical and cannot withstand temperatures below 25°F. Hardiness varies according to species. Test results of macadamias in Texas are not known, but the only area with possible adaptation is the Lower Rio Grande Valley. □

Propagation methods for Texas fruit and nuts

Plant	Method[1] Budding, grafting	Cutting, layering, suckering	Seedage
Temperate fruits			
Apple	Whip graft, chip bud, **T-bud**		
Apricot	**T-bud**, bark graft		
Blackberry		**Root cutting**, softwood cutting, simple layering, suckers	
Blueberry		**Softwood cutting**, suckers	
Fig		**Hardwood cutting**, air layering	
Grape, bunch	Whip graft, T-bud, chip bud, grown cleft, bark graft	Hardwood cutting	
Grape, muscadine		**Softwood cutting**, simple layering, mound layering	
Jujube	Whip graft	**Softwood cutting** root sprouts	
Nectarine	**T-bud**, bark graft		Common for rootstocks[4]
Peach	**T-bud**, bark graft		Common for rootstocks[4]
Pear	**T-bud**, whip graft, bark graft		
Pecan	**Patch bud**, whip graft, bark graft[3], **four-flap graft**		Common for rootstocks
Persimmon	**Chip bud**, whip graft, graft[2]		
Plum	Inlay bark, **T-bud**		
Pomegranate		**Hardwood** and softwood **cuttings**, suckers	
Raspberry		**Softwood cuttings**, simple layerings, suckers	
Walnut	**Patch bud**, whip graft, bark graft[3], **four-flap graft**		
Subtropical Fruits			
Avocado	Chip bud, bark graft[3], side veneer graft, **cleft (tip) graft**		Common for rootstocks
Banana		**Suckers**	
Citrus	**T-bud**	Hardwood cutting, semi-hardwood cutting, air layering	Common for rootstocks
Mango	Chip bud, side-veneer graft, **cleft (tip) graft**		Common for rootstocks
Papaya		Softwood cutting	**Common**

[1] Preferred or most common method is shown in boldface
[2] Primarily used in top-working, established trees
[3] Also used in top-working, established trees
[4] Remove seeds from pit

Recognize Insect Pests in Fruit and Nut Trees

One of the biggest problems facing homeowners growing peaches and plums is controlling insect pests. If not controlled, some insect pests will destroy the entire crop of peaches and plums while others will destroy the trees.

Scale Insects

The white peach scale and the San Jose scale are two serious pests of trees. These pests attach themselves to the limbs and suck out plant sap. Heavy infestations may kill limbs or even the entire tree in the dormant season.

Plum Curculio

The plum curculio is a devastating pest of peaches and plums. The adult is a weevil. Female weevils lay eggs in fruit, and larvae feed on developing fruit. Small fruit will fall off the tree, and larger fruit are ruined by feeding larvae on the inside. To control this pest, apply insecticides first when petals begin to fall off the newly pollinated fruit. Make additional applications at the shuck split stage and then at 2-week intervals to include three more applications.

Catfacing Insects

"Catfacing" is a term used to describe damage to fruit which causes them to be deformed and pitted. Catfacing is caused by insects feeding on growing fruit. These pests include stink bugs, leaffooted bugs, green June beetles and others. Use control measures when these pests are observed.

Peach Tree Borer

The peach tree borer is the larval stage of a moth. Larvae bore into the peach or plum tree close to the ground level. Heavily infested trees may be girdled causing the tree to die. This pest is best controlled in mid-to-late August. For best results, thoroughly cover the trunk with insecticide.

Major Pecan Pests

Major pecan pests can be divided into two groups — those which feed on foliage and those which feed on nuts. Application timing is extremely important if pecans are to be protected from these pests.

Scale Insects

The obscure scale can cause severe damage to pecans. It is a small pest which attaches itself to small limbs and sucks juice from the tree.

Phylloxera

Phylloxera are small aphid-like pests which cause galls to develop on leaves and petioles early in the growing season.

Pecan Nut Casebearer

The pecan nut casebearer is the larvae of a small moth. Larvae bore into small nutlets and destroy them. They are capable of destroying the entire nut crop if not controlled. To control this pest, look for their eggs on the tip of young nutlets, about the time of pollination. Time insecticide applications to egg hatch for best control. A second generation of pecan nut casebearers occurs about 6 weeks after the first and often needs to be controlled.

Hickory Shuckworm

The hickory shuckworm is the larvae of a small moth. It feeds on the shuck surrounding the developing pecan. This prevents the pecan from developing fully and often stops development completely. This pest occurs in mid-to-late August. It takes two insecticide applications at 2-week intervals to give good control.

Aphids

Aphids may occur from late spring until late fall. Apply a treatment when aphids are found on the foliage.

Pecan Weevil

The pecan weevil occurs only in the northern half of the state. It becomes a pest in mid-to-late August.

Foliage Pests

A number of foliage-feeding larvae can damage pecans. Some of the most important are the fall webworm and the walnut caterpillar. Watch for infestations of these pests. When extensive foliage feeding is observed, control the pests with applications of the same insecticides used on the pecan nut casebearer.

100+ Pests

More than 100 species of insects have attacked the home garden and orchard. Most are only occasional pests, but many are commonly found feeding on vegetables and fruit.

Many pests attack the foliage, others may feed on plant roots or on the fruit. Many pests can build up high numbers rapidly, causing extensive damage quickly. □

Controls Available for Growers

Home growers need to recognize pest species and be familiar with their damage. Also, they should be able to recognize beneficial insects which help control pest species. Texas Agricultural Extension Service publications L-1876, *The Peachtree Borer*, B-1238, *Pecan Insects of Texas* and L-1440, *Homeowners Fruit and Nut Spray Schedule*, are useful in learning to identify and control pests of fruits and nuts.

Gardeners should inspect their orchard frequently. If damage and insect pests are found, apply an insecticide. Repeated applications may be necessary with some pests. Check plants 2 to 3 days after application to see if adequate control has been achieved. Apply insecticides according to label directions.

Helpful Hints

Home fruit growers continuously battle insect pests. Certain practices help to control fruit pests and protect the quality of produce. Some helpful hints are listed below.

- Keep plants in a healthy, vigorous state. Healthy plants can withstand insect attacks much better than weak plants. Do not allow plants to suffer from lack of water or fertilizer.
- When infestations of damaging pests are found, apply a registered insecticide immediately. Do not allow pests to build up high numbers.

Several pesticide formulations are available for home orchard use. At certain times one formulation may be better than another. Decisions on what formulation to purchase and use depends upon personal preference, convenience, equipment available and at times upon the pest which needs to be controlled.

Pesticide Forms

Dusts

Dusts are ready to use in the desired concentration and require no dilution or mixing. They are easily applied and are most effective when used thoroughly but sparingly. Dusts cannot be mixed with water.

Soluble Powders or Wettable Powders

These formulatons are purchased as concentrates. They are to be diluted before use by mixing with water. Do not use them as dusts as this may damage plants.

Emulsifiable Concentrates

An emulsifiable concentrate is a liquid formulation which is to be diluted with water to obtain the desired concentration for treating plants.

Granules

Granules are dry, granulated materials ready to use. Spread them on the surface or work into the top 2 to 3 inches of soil.

Bait

A poison bait contains a desired food of the pest. When the pest eats the bait, it ingests enough toxicant to kill it. Baits are applied to areas that pests frequent. □

Pick Fruit at Peak of Maturity

Harvesting fruit at proper maturity and storing it under proper conditions can be just as important as a good spray program. Immature fruit lacks characteristic flavor and texture, while over-mature fruit is usually mealy with rapid tissue breakdown which does not hold up in storage.

Where ripening characteristics are concerned, fruits fall into three categories:

(1) Those picked green-mature for storage, but flavor is not as good as those that reach full maturity on-tree (such as peaches, nectarines and plums);

(2) Those picked and ripened in storage where flavor is as good or better than tree-ripened (including avocados and bananas which mature on the tree but do not reach peak flavor until picked and held for 4 to 5 days at room temperature); and

(3) Those fruits which must ripen on the tree or vine (grapes, blackberries and citrus, for example).

Besides fruit maturity, other important points to consider are proper handling and storage. The fruit's skin or peel provides a natural barrier to insects and diseases; therefore, gentle handling to prevent punctures and bruises is essential. Discard any diseased or bruised fruit or use immediately. Proper storage is a real key in maintaining fruit quality. Fully ripe fruits store best at refrigerator temperatures. □

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